The Perturbations of Halley's Comet. By P. H. Cowell and A. C. D. Crommelin.

Shortly after the December meeting we decided to undertake jointly the computation of the perturbations of Halley's Comet. Wishing to ascertain as rapidly as possible whether Pontécoulant's date of the next perihelion passage (1910 May 23) was approximately correct, we made a preliminary computation of the Jupiter perturbations, dividing the comet's orbit into eighty portions, and closely following Pontécoulant's method. We introduced, however, two modifications, which we think are improvements:—

(1) Pontécoulant has made his computation needlessly long by the retention of a number of meaningless and superfluous figures; thus he determines the perturbing forces X, Y parallel to the principal axes of the ellipse to two places of decimals, implying, as a rule, three significant figures; but the product of these, by the factor reducing the perturbation to seconds of arc, is given to six significant figures, of which only three can be trusted. We have restricted ourselves to the reliable figures, which involves no loss of accuracy.

(2) Pontécoulant performs the multiplication by these factors separately for each element of the orbit. We have first taken the sum of the components and multiplied by the reducing factor once for all at the end, thus saving much labour.

We are now undertaking a more accurate investigation of the perturbations, dividing the orbit into 180 portions, and including the perturbing effect of Venus, the Earth, and Neptune, which Pontécoulant did not consider. We therefore deem it unnecessary to do more at present than give the two main results of our preliminary work, which are as follows:—

(1) 1910 May is the correct date within a month for the next perihelion passage. Our actual result is a fortnight earlier than Pontécoulant's, but we lay no stress on the difference.

(2) Our computations confirm the suspicion expressed in December, that Pontécoulant's value of the eccentricity in 1910 is notably in error. In fact, we make the perihelion distance appreciably the same as at the last return (0·59), whereas he increased it to 0·68. This change is of some importance, as it would considerably affect the geocentric path of the comet at the next return, and would also considerably modify the point at which the meteors accompanying the comet would intersect the Earth's orbit.

Result (1) indicates that Ångström's curve fails utterly for the next return, and throws much doubt on the reality of his two inequalities. Possibly many of the earlier returns of the comet have been wrongly identified by Hind and Ångström, and the latter's curves may thus be erroneous.

On the Errors of a Photographed Réseau. By W. H. M. Christie, A. S. Eddington, and C. Davidson.

The investigation which is here described was undertaken in connection with the discussion of the results of the Greenwich photographs of Eros 1900–1901. The determination of the division errors of the réseau as imprinted on the photographic plates to the very high degree of accuracy required, is in some respects a new problem, so that some of the methods and results may be of interest.

An account of the preliminary determination of the errors of the réseau (No. 90), which was used for all the Eros photographs, is printed in the Introduction to the Astrographic Catalogue, Greenwich Section, vol. i. p. xxxvii. These provisional division errors were applied in the reduction of the measures of photographs, but a much more extensive investigation was felt to be necessary in order to deduce a trustworthy value of the solar parallax from the results.

A preliminary comparison made in 1903 between the réseau itself and photographs of it on seven plates had shown that there were sensible differences, which called for further discussion after the heavy work of measurement of the Eros plates had been completed. It may here be explained that the réseau is imprinted on the photographic plate by parallel rays from an electric lamp in the focus of the 13-inch object-glass of the Astrographic telescope, the réseau and the plate being mounted face to face, as nearly as possible in contact just outside the object-glass. It is to be noted that the parallel rays necessarily pass through the glass of the réseau from the back before falling on the silver film.

Under the ordinary conditions the réseau is reversed with the telescope in passing from east to west of the pier, the same edge of the plate being in contact with the bearing studs, on both sides of the pier. In consequence of this reversal the division errors of the central line 14 and the adjacent line 13 or 15, between which Eros is usually placed, affect the R.A. of Eros with opposite signs on photographs taken with the telescope east and west of the pier respectively, and thus directly enter into the value of the parallax deduced from morning and evening photographs, with telescope east and west respectively.

It was therefore necessary to determine the division errors of lines 13, 14, 15 with a degree of accuracy far beyond that required for the other lines.

What was required in this new investigation was the error of that part of the réseau where Eros falls, referred to the mean of that part of the réseau on which those stars fall, from which the co-ordinates of the plate centre were deduced. In the Greenwich results three series of places of Eros have been determined, viz. (1) Astrographic photographs using *reference stars* selected within 55′ of the centre; (2) Astrographic photographs using *comparison stars*